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IS 4696-1 (2004): Dimensions for saw tooth threads, Part I:  
Basic and design profiles [PGD 20: Engineering Standards]



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भारतीय मानक  
मीट्रिक बट्रेस चूड़ियों के लिए आयाम

भाग 1 चूड़ी की प्रोफाइल

( दूसरा पुनरीक्षण )

*Indian Standard*

**DIMENSIONS FOR METRIC BUTTRESS THREADS**

**PART 1 THREAD PROFILES**

*( Second Revision )*

ICS 21.040.10

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**BUREAU OF INDIAN STANDARDS**  
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NEW DELHI 110002

## FOREWORD

This Indian Standard (Part 1) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Engineering Standards Sectional Committee had been approved by the Medical Instruments, General and Production Engineering Division Council.

This standard was first published in 1968 and subsequently revised in 1976 splitting up into four parts. The other parts in the series are:

- |                 |                            |
|-----------------|----------------------------|
| (Part 2) : 1976 | Pitch diameter combination |
| (Part 3) : 1976 | Basic dimensions           |
| (Part 4) : 1976 | Tolerancing system         |

The title of the standard in general has also been modified in line with DIN 513.

The earlier edition of this standard (Part 1) was in line with DIN 513 (Part 1) - 1975. In the preparation of this revision considerable assistance has been derived from latest edition of DIN 513 Sheet 1- 1985 'Metrisches sagengewinde, Gewindeprofile (Metric buttress threads, thread profiles)', issued by DIN, Deutsches Institut für Normung and it has been brought in line with it.

In this revision, the dimensioning and the formula in Fig. 2 has been modified and the pitch diameter of the internal threads is greater than that of the external thread by:

$$2. \cos 3^\circ \frac{\sin 30^\circ}{\sin 147^\circ} \cdot \tan 60^\circ \cdot a = 3.175 \, 82 \cdot a$$

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# Indian Standard

## DIMENSIONS FOR METRIC BUTTRESS THREADS

### PART 1 THREAD PROFILES

( Second Revision )

#### 1 SCOPE

This standard (Part 1) covers the basic and nominal profiles for metric buttress threads in the diameter range of M 10 to M 640 mm.

#### 2 SYMBOLS

The various symbols used in this standard shall denote the quantities mentioned below against each:

- $D$  = major diameter of internal threads,
- $d$  = major diameter of external threads,
- $D_2$  = pitch diameter of internal threads,
- $d_2$  = pitch diameter of external threads,
- $D_1$  = minor diameter of internal threads,
- $d_1$  = minor diameter of external threads,
- $P$  = lead of single start screw thread and pitch of multiple start screw threads,
- $H$  = height of fundamental triangle,
- $H_1$  = height of basic profile,
- $h_2$  = height of external thread profile,
- $R$  = radius at root of external threads, and
- $w$  = profile width at major diameter.

#### 3 BASIC PROFILE

3.1 The basic profile is the theoretical profile associated with the basic sizes of the major, pitch and minor diameters and shall be as given in Fig. 1. The basic dimensions of basic profile shall be as given in Table 1.

3.2 The minor diameter clearance and the clearance between the non-stressed thread flank (see 4) and the fundamental deviations of the pitch diameter of the stressed thread flank (see 5) are related to these basic sizes.

#### 4 NOMINAL PROFILES

4.1 The nominal profiles to which the deviations and tolerances are related have specified clearances on the minor diameter and between the non-load bearing thread flanks, relative to the basic profile (see Fig. 1).

4.2 The numerical threads data associated with the nominal profile is given in Table 2.

#### 5 PROFILES OF THREADS WITH CLEARANCE ON THE FLANK

5.1 The formulae associated with the dimensions

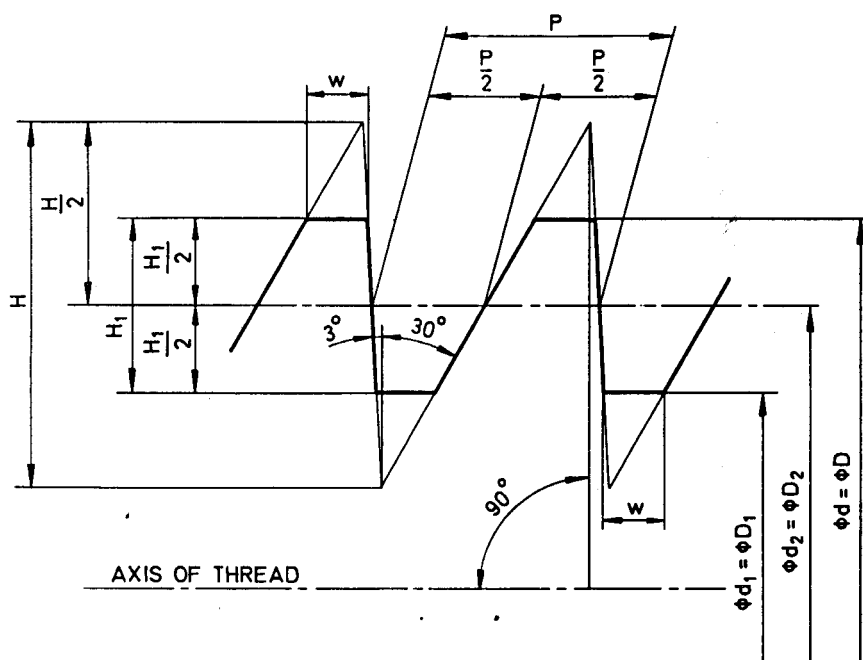


FIG. 1 BASIC PROFILE FOR METRIC BUTTRESS THREADS

Table 1 Dimensions of Basic Profile  
(Clause 3.1)

All dimensions in millimetres.

Pitch <i>P</i>	<i>H</i>	<i>H</i> /2	<i>H</i> <sub>1</sub>	<i>w</i>
	1.587 8 <i>P</i>	0.793 9 <i>P</i>	0.75 <i>P</i>	0.263 84 <i>P</i>
(1)	(2)	(3)	(4)	(5)
2	3.175 6	1.587 8	1.50	0.527 68
3	4.763 4	2.381 7	2.25	0.791 52
4	6.351 2	3.175 6	3.00	1.055 36
5	7.939 0	3.969 5	3.75	1.319 20
6	9.526 8	4.763 4	4.50	1.583 04
7	11.114 6	5.557 3	5.25	1.846 88
8	12.7024	6.351 2	6.00	2.110 72
9	14.290 2	7.145 1	6.75	2.374 56
10	15.878 0	7.939 0	7.50	2.638 40
12	19.053 6	9.526 8	9.00	3.166 08
14	22.229 2	11.114 6	10.50	3.693 76
16	26.404 8	12.702 4	12.00	4.221 44
18	28.580 4	14.290 2	13.50	4.749 12
20	31.756 0	15.878 0	15.00	5.276 80
22	34.931 6	17.465 8	16.50	5.804 48
24	38.107 2	19.053 6	18.00	6.332 16
28	44.458 4	22.229 2	21.00	7.387 52
32	50.809 6	25.404 8	24.00	8.442 88
36	57.160 8	28.580 4	27.00	9.498 24
40	63.512 0	31.756 0	30.00	10.553 60
44	69.863 2	34.931 6	33.00	11.608 96

indicated in Fig. 2 and Fig. 3 are given below:

$H_1 = 0.75 P$   
 $h_3 = H_1 + a_c = 0.867 77 P$   
 $a = 0.1 \sqrt{P}$  (axial play)  
 $a_c = 0.117 77 P$   
 $w = 0.263 84 P$   
 $e = 0.263 84 P - 0.1 \sqrt{P} = w - a$   
 $R = 0.124 27 P$   
 $D_1 = d - 2 H_1 = d - 1.5 P$   
 $d_3 = d - 2 h_3$   
 $d_2 = d - 0.75 P$   
 $D_i = d - 0.75 P + 3.175 8 a$

5.2 The profiles for external and internal threads with clearance on the non-load bearing flank on the minor diameter but with no clearance between the load bearing flanks or on the major diameter (nominal size) is indicated in Fig. 2.

5.3 The profile for external and internal threads with

clearances on the minor diameter and on the flank (standard nut system) but with no clearance on the major diameter is indicated in Fig. 3.

$s = 0.314 9 A_0$

where

$A_0$  = fundamental deviation (upper deviation) for external thread on the pitch diameter.

6 PROFILE FOR MULTIPLE-START THREADS

6.1 The profile for multiple-start threads is given in Fig. 4.

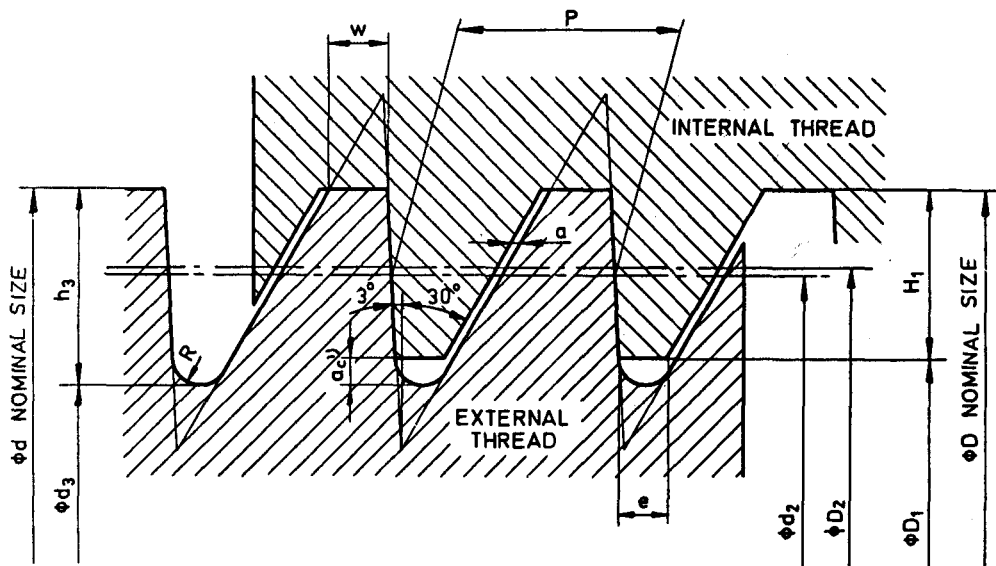
$P_h$  = lead (axial advance at one turn), and  
 $P$  = pitch (axial distance between two neighboring flanks being in the same direction).

6.2 Multiple start (*n*-start) threads have the same profile as single start threads with lead  $P_h$  = pitch  $P$ . For the pitch  $P$  of multiple start threads, only the values permitted for the lead  $P$  (which is equal to pitch  $P$ ) of single start threads may be selected. However, the multiple of the pitch  $P$  of multiple-start threads need not correspond to the value permitted for single start threads.

Table 2 Basic Numerical Threads Data for Nominal Profile  
(Clause 4.2)

All dimensions in millimetres.

$P$	$a_e$ $0.117\,77\,P$	$a$ $0.1\sqrt{P}$	$e$ $0.263\,84\,P - 0.1\sqrt{P}$	$h_1$ $0.867\,77\,P$	$R$ $0.124\,27\,P$
(1)	(2)	(3)	(4)	(5)	(6)
2	0.236	0.141 4	0.386	1.736	0.249
3	0.353	0.173 2	0.618	2.603	0.373
4	0.471	0.2	0.855	3.471	0.497
5	0.589	0.223 6	1.096	4.339	0.621
6	0.707	0.244 9	1.338	5.207	0.746
7	0.824	0.264 6	1.582	6.074	0.870
8	0.942	0.282 8	1.828	6.942	0.994
9	1.060	0.3	2.075	7.810	1.118
10	1.178	0.316 2	2.322	8.678	1.243
12	1.413	0.346 4	2.820	10.413	1.491
14	1.649	0.374 2	3.320	12.149	1.740
16	1.884	0.4	3.821	13.884	1.988
18	2.120	0.424 3	4.325	15.620	2.237
20	2.355	0.447 2	4.830	17.355	2.485
22	2.591	0.469 0	5.335	19.091	2.734
24	2.826	0.489 9	5.842	20.826	2.982
28	3.298	0.529 2	6.858	24.298	3.480
32	3.769	0.565 7	7.877	27.769	3.977
36	4.240	0.6	8.898	31.240	4.474
40	4.711	0.632 5	9.921	34.711	4.971
44	5.182	0.663 3	10.946	38.182	5.468



<sup>1)</sup> The index C stands for crest.

FIG. 2 PROFILES FOR EXTERNAL AND INTERNAL THREADS WITH CLEARANCE ON THE NON-LOAD BEARING FLANK ON THE MINOR DIAMETER BUT WITH NO CLEARANCE BETWEEN THE LOAD BEARING FLANKS OR ON THE MAJOR DIAMETER (NOMINAL SIZE)



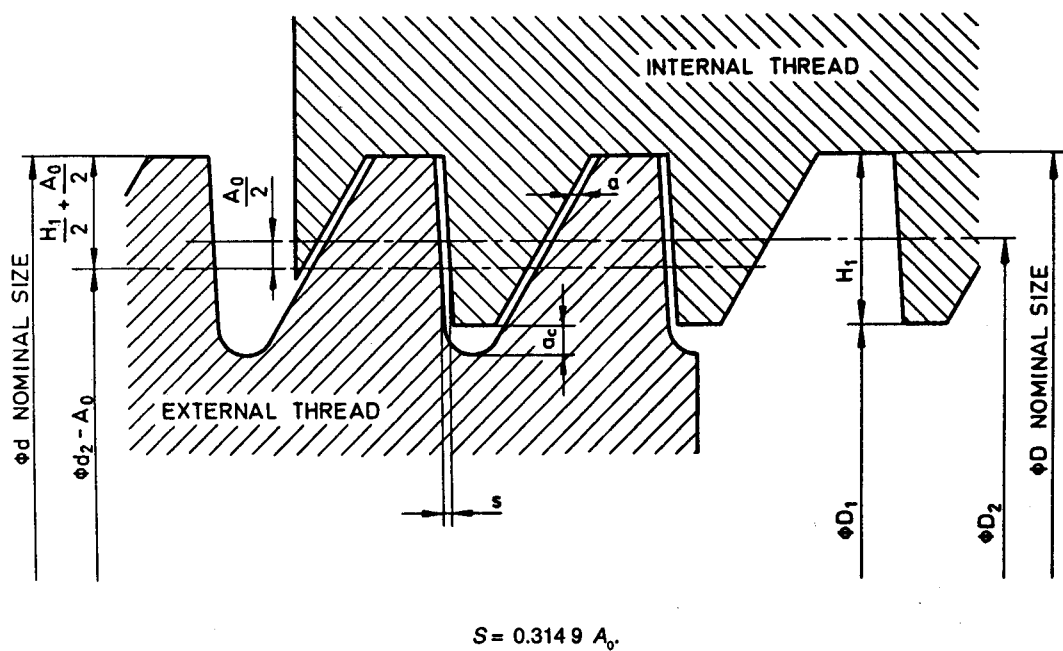
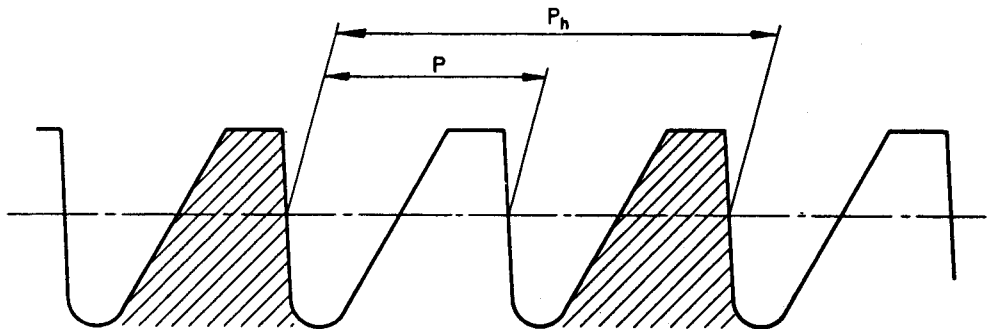


FIG. 3 PROFILES FOR EXTERNAL AND INTERNAL THREADS WITH CLEARANCES ON THE MINOR DIAMETER AND ON THE FLANK (STANDARD NUT SYSTEM) BUT WITH NO CLEARANCE ON THE MAJOR DIAMETER



$P_h$  = lead (axial advance at one turn).  
 $P$  = pitch (axial distance between two neighboring flanks being in the same direction).

FIG. 4 PROFILES FOR MULTIPLE-START THREADS

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